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To compare COPD GOLD ABCD assessment tool versus the new ABE assessment tool : A cross-sectional study.

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Abstract

Chronic Obstructive Pulmonary Disease (COPD) presents significant challenges in clinical management, necessitating effective assessment tools for patient stratification. The ABCD assessment tool aimed to classify patients into four groups by integrating spirometry, patient-reported symptoms (via the modified British Medical Research Council questionnaire and the COPD Assessment Test), and exacerbation history.(1) However, it faced limitations in predicting mortality and health outcomes, particularly due to overlapping influences in group D.

To address these issues, a revised approach in 2017 separated spirometry grading from symptom-based classification, offering clearer insights into patient conditions. The recent GOLD 2023 report introduces the ABE assessment tool, which emphasizes the importance of exacerbations by merging groups C and D into a single 'E' group. (2) This change aims to streamline assessment and highlight the therapeutic implications of exacerbation management.

This paper reviews the evolution of COPD assessment strategies, focusing on the transition from the ABCD to the ABE model. It discusses the clinical relevance of these updates and highlights the need for ongoing research to validate this new categorization. By improving our understanding of COPD classification, we aim to enhance patient outcomes and inform future therapeutic approaches.

Background

Chronic Obstructive Pulmonary Disease (COPD) is a progressive lung condition characterized by airflow limitation and significant morbidity. The effective management of COPD requires precise assessment tools that can stratify patients based on their clinical presentation and history. The ABCD assessment tool, developed by the Global Initiative for Chronic Obstructive Lung Disease (GOLD), integrated spirometry results, patient-reported symptoms, and exacerbation history to classify patients into four distinct groups (A, B, C, and D). (1) While this tool marked a critical advancement in understanding patient profiles, it had limitations in its predictive capabilities for mortality and health outcomes, particularly in the overlapping parameters of group D.

In 2023, the GOLD report introduced the ABE assessment tool, refining the previous classification system to address these limitations. This new tool recognizes the significance of exacerbations as independent predictors of health outcomes, irrespective of symptom severity. Notably, the previous groups C and D have been merged into a single 'E' group, termed “Exacerbations,” while the thresholds for groups A and B remain unchanged. This modification aims to streamline clinical

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assessment and enhance treatment recommendations, emphasizing the need for a therapeutic focus on managing exacerbations. (2)
In our study, we aimed to compare whether there are significant differences in clinical and biochemical, among patients classified using the old ABCD assessment tool compared to those classified under the new ABE tool. Understanding these distinctions is crucial for validating the clinical utility of the ABE assessment model and for determining its impact on patient management strategies. By examining these parameters, we hope to provide insights that could inform clinical practice and enhance the understanding of COPD pathology across different assessment frameworks.

Keyword

COPD, GOLD, ABCD assessment tool, ABE assessment tool.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a progressive lung disease characterized by persistent airflow limitation and significant morbidity. Effective management of COPD requires precise patient stratification to tailor treatment strategies accordingly. The ABCD assessment tool, developed by the Global Initiative for Chronic Obstructive Lung Disease (GOLD), aimed to classify patients into four groups (A, B, C, and D) by integrating spirometry results, patient-reported symptoms (via the modified British Medical Research Council questionnaire and the COPD Assessment Test), and exacerbation history. Despite its contributions to understanding patient profiles, the ABCD tool exhibited limitations in predicting mortality and health outcomes, particularly due to the overlapping influences in group D.
To address these challenges, a revised approach in 2017 separated spirometry grading from symptom-based classification, offering clearer insights into patient conditions. The GOLD 2023 report further refines this classification system with the introduction of the ABE assessment tool. This new tool emphasizes the importance of exacerbations as independent predictors of health outcomes, merging the previously distinct groups C and D into a single 'E' group, termed "Exacerbations." While maintaining the thresholds for groups A and B, this change aims to streamline clinical assessment and enhance treatment recommendations, particularly in exacerbation management.
Our study seeks to investigate whether there are significant differences in clinical and biochemical features among patients classified using the old ABCD assessment tool compared to those classified under the new ABE tool. Understanding these distinctions is essential for validating the clinical utility of the ABE assessment model and determining its implications for patient management strategies. By examining these parameters, we aim to provide valuable insights that can inform clinical practice and deepen our understanding of COPD pathology across different assessment frameworks.

Material and methodology

Source of Data: The study was conducted in Department of Respiratory Medicine, at Tertiary care hospital.

Study Population: After getting approval from an institutional ethical committee, this study was conducted on patients presenting to the departments of respiratory medicine and general medicine with symptoms of cough, expectoration, breathlessness, wheezing, weight loss, anorexia, and low body mass index. All patients had a post-bronchodilation FEV1/FVC ratio of less than 0.7.

Inclusion Criteria:

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COPD patients with a post-bronchodilator FEV1/FVC ratio of less than 0.70 were included.

Exclusion Criteria:

Patients with asthma, those unable to perform lung function tests such as PFT and the 6-minute walk test, and patients with chronic lung diseases like pneumonia, bronchiectasis, diffuse pan bronchiolitis or bronchiolitis obliterans, interstitial lung disease, mass lesions, and solitary pulmonary nodules were excluded. Additionally, patients with a history of pneumonectomy or other lung surgery, associated rheumatological diseases, or diagnosed cardiac disorders were also excluded.

Duration of study: The study was carried out from August 2022 to December 2023.

Study Design: Cross sectional study.

Sampling technique: A non-probability sampling method, specifically purposive quota sampling, was used.

Sample size: The study was carried out from August 2The sample size was calculated using a study conducted in India by Prabhu Rajkumar et al. (3) in 2017, which found the prevalence of COPD to be 3.49%. At a 95% confidence level and an absolute allowable error of 3%, the sample size was calculated using the formula:022 to December 2023:

Sample size(n) = $\frac{Z^2_{1-\alpha/2} * p * q}{d^2}$,

Where,

q = 1-p

$Z^2_{1-a/2}$ = Is standard normal variate (at 5% type I error ($p<0.05$) it is 1.96 and 1% type I error ($p<0.01$) it is 2.58). As in majority of studies P values are considered significance below 0.05 hence 1.96 is used in formula.

P = Expected prevalence in population based on previous studies or pilot studies.

d = Absolute error or precision.

Sample size (n) = 140.74

The calculated sample size was 140.74, thus at least 140 suspected samples were included in the study.

Method of Data Collection:

Patients were selected after applying inclusion and exclusion criteria. Informed written consent was obtained from the patients, and the entire procedure was explained clearly. Demographic details were recorded, and detailed history and clinical examinations were performed. The CAT and mMRC respiratory questionnaires in Kannada or English were administered, and patients marked their symptoms. The total CAT score and mMRC score for each patient were calculated and recorded.

Spirometry was conducted to measure FEV1, FVC, the ratio of FEV1/FVC. Patients were then administered 200–400 micrograms of salbutamol, and spirometry was repeated after 15 minutes to record post-bronchodilation values.

The 6-minute walk test was performed according to ATS guidelines. Prior to the test, heart rate, blood pressure, and SpO2 measurements were taken. Emergency resuscitation measures were prepared in

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case of complications. Patients walked in a loop of 100 meters at their own pace, and the test was stopped if severe symptoms occurred.

For each patient, spirometry indices (FEV1, FVC, FEV1/FVC ratio), and the distance walked in the 6-minute walk test were noted. Blood investigations included measurements of white blood cells, C-reactive protein.

Results

Table 1: Patients and Gender distribution with respect to COPD Class.

Count								%
COPD class			Class A		35		25.0%	
			Class B		39		27.9%	
			Class E		66		47.1%	
			Total		140		100.0%	
		COPD class						P value
		Class A		Class B		Class E		
		Count	%	Count	%	Count	%	
Gender	Male	21	60.0%	21	53.8%	30	45.5%	0.356
	Female	14	40.0%	18	46.2%	36	54.5%	

Table 2a: Symptoms distribution with respect to C, D class of ABCD and E Class of ABE assessment tool of COPD patients.

		COPD class						P value
		Class C		Class D		Class E		
		Count	%	Count	%	Count	%	
Breathlessness	Yes	36	100.0%	30	100.0%	66	100.0%	< 0.001
	No	0	0%	0	0%	0	0.0%	
Cough	Yes	36	100.0%	30	100.0%	66	100.0%	-
Expectoration	Yes	4	11.1%	1	3.3%	61	92.4%	<0.001
	No	32	88.9%	29	96.7%	5	7.6%	
Wheeze	Yes	9	25.0%	1	3.3%	56	84.8%	0.001
	No	27	75.0%	29	96.7%	10	15.2%	
Chest pain	Yes	24	66.7%	22	73.3%	20	30.3%	0.001
	No	12	33.3%	8	26.7%	46	69.7%	
Weight loss	Yes	34	94.4%	30	100.0%	2	3.0%	0.321

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	No	2	5.6%	0	0.0%	64	97.0%	
Anorexia	Yes	28	77.8%	20	66.7%	18	27.3%	0.001
	No	8	22.2%	10	33.3%	48	72.7%	
Syncope	No	36	100.0%	30	100.0%	66	100.0%	-

Symptoms distribution with respect to C, D class of ABCD and E Class of ABE assessment tools for COPD patients.

The table summarizes symptom distribution among COPD patients classified under ABCD (Classes C and D) and ABE (Class E). Breathlessness is exclusively reported in Class E (100%), with no cases in Classes C or D. Cough is uniformly present across all classes at 100%. Expectoration is significantly higher in Class E (92.4%) compared to Class C (11.1%) and Class D (3.3%). Wheezing is also more prevalent in Class E (84.8%) than in Class C (25.0%) and Class D (3.3%). Chest pain is reported more frequently in Classes C (66.7%) and D (73.3%) than in Class E (30.3%). Weight loss is high in Classes C (94.4%) and D (100%), but very low in Class E (3.0%), with no significant difference. Anorexia is significantly more common in Classes C (77.8%) and D (66.7%) than in Class E (27.3%). Overall, significant differences are noted for breathlessness, expectoration, wheezing, chest pain, and anorexia, while weight loss shows no significant variation.

Table 2b: Comparison of the Inflammatory marker, spirometry parameter and 6MWT distance among Laboratory profile comparison between Class C, D of ABCD and Class E of ABE assessment tool among COPD patients.

		COPD class					
		Class C		Class D		Class E	
		Mean	SD	Mean	SD	Mean	SD
Inflammation markers	TLC	8086.11	2667.49	8886.67	3742.83	8450.00	3200.44
	CRP	11.75	3.05	13.1	3.55	12.36	3.33
FVC	Predicted	2.96	.16	2.40	.09	2.68	0.12
	Actual	1.72	.09	1.14	.05	1.43	0.07
FEV1	Predicted	2.21	.13	2.25	.12	2.23	0.12
	Actual	.99	.09	.98	.08	0.98	0.08
6MWT	Predicted	292	-	276	-	289	-
	Actual	223		169		196	

Parameter	Comparison among Different classes	P value (<0.05 significant)
TLC	Class C v/s Class E	0.016
	Class D v/s Class E	0.021
CRP	Class C v/s Class E	0.040
	Class D v/s Class E	0.030
FVC	Class C v/s Class E	0.54
	Class D v/s Class E	0.44
FEV1	Class C v/s Class E	0.91
	Class D v/s Class E	0.95

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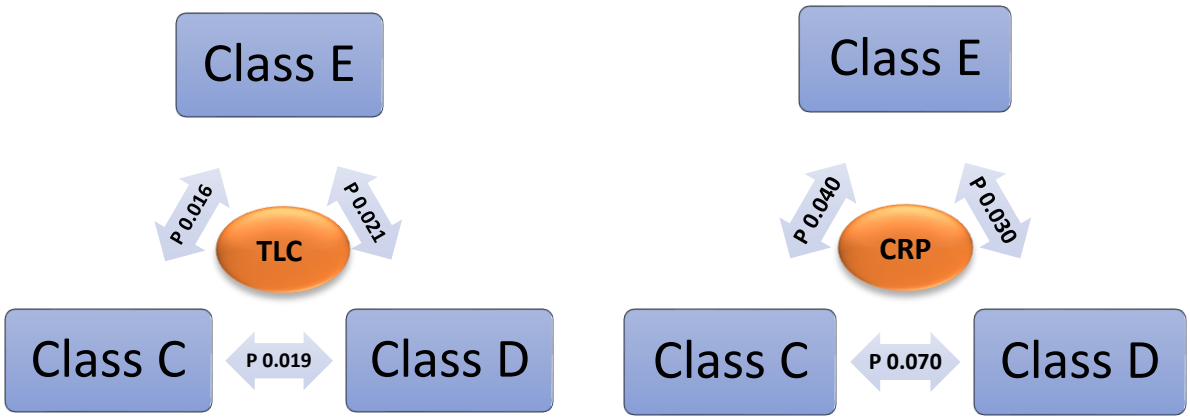
6MWT distance	Class C v/s Class E	0.35
	Class D v/s Class E	0.44

Comparison of the Inflammatory marker, spirometry parameters and 6MWT distance among between laboratory profile comparison between Class C, D of ABCD and Class E of ABE. The comparison of inflammatory markers, spirometry parameters, and 6MWT distances among COPD patients in Classes C and D of the ABCD assessment tool and Class E of the ABE assessment tool reveals several significant findings. For inflammation markers, total leukocyte count (TLC) shows significant differences between Class C and Class E ($p = 0.016$) and Class D and Class E ($p = 0.021$). C-reactive protein (CRP) levels are also significantly different between Class C and Class E ($p = 0.040$) and Class D and Class E ($p = 0.030$). In contrast, no significant differences are found in forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) when comparing Class C and D to Class E, with p-values of 0.54 and 0.91 for FVC, and 0.44 and 0.95 for FEV1, respectively. The 6MWT distances show no significant differences either, with p-values of 0.35 for Class C versus Class E and 0.44 for Class D versus Class E. Overall, while inflammatory markers show significant variations, spirometry parameters and 6MWT distances do not exhibit significant differences between the classes among COPD patients.

Figure 2b: Statistical significance among Inflammatory marker, spirometry parameter and 6MWT distance among Laboratory profile comparison between Class C, D of ABCD and Class E of ABE assessment tool among COPD patients.



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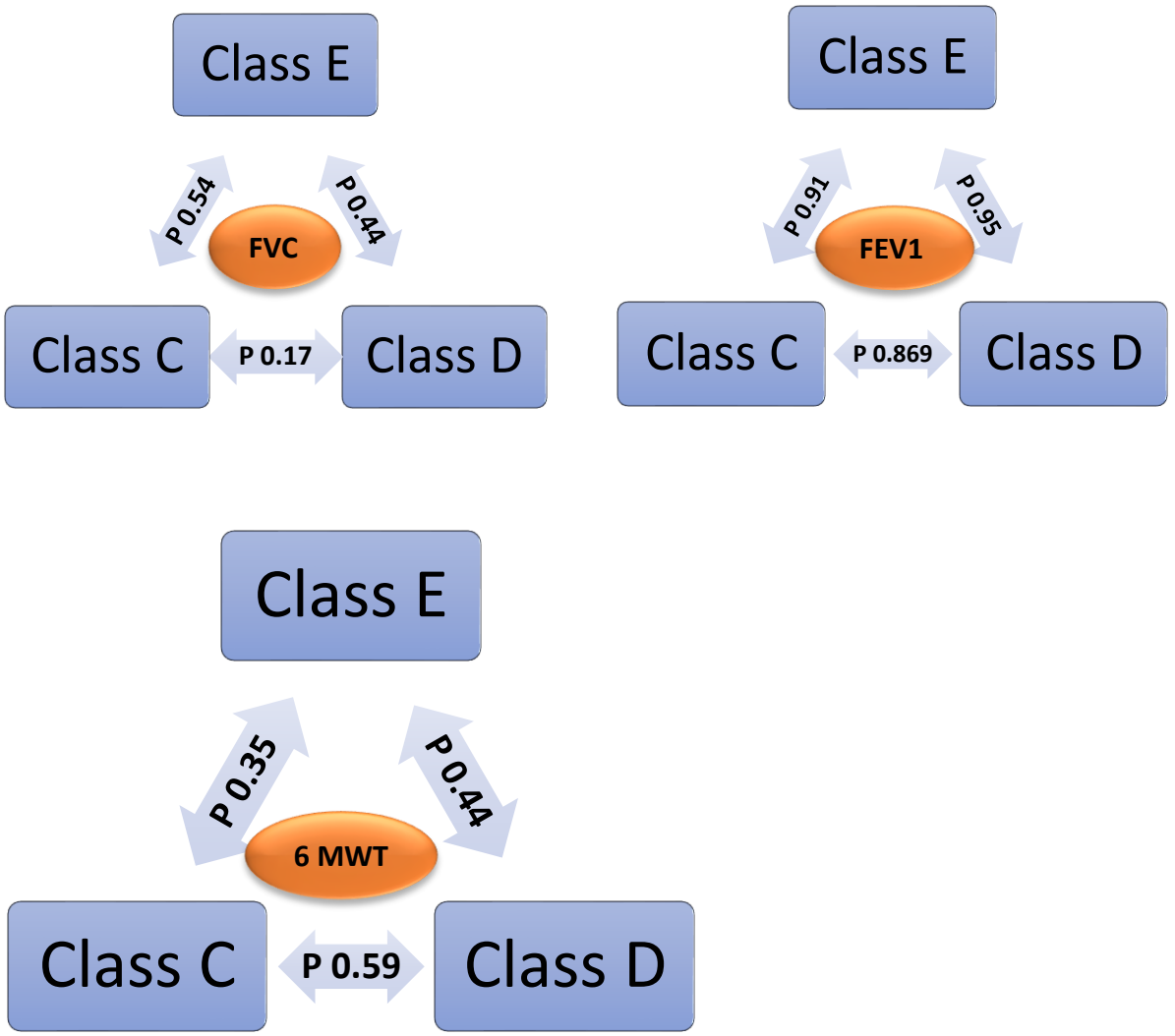

Discussion

The data from COPD classes C, D, and E provide significant insights into the relationships between inflammation markers and functional performance. Total Lung Capacity (TLC) was highest in Class D (8886.67 ± 3742.83), followed by Class E (8450.00 ± 3200.44) and Class C (8086.11 ± 2667.49), with significant differences noted between Class C and Class E ($p = 0.016$) and Class D and Class E ($p = 0.021$). C-reactive protein (CRP) levels were also elevated, particularly in Class D (13.1 ± 3.55), showing significant differences between Class C and Class E ($p = 0.040$) and Class D and Class E ($p = 0.030$). In terms of functional performance as measured by the 6-minute walk test (6MWT), predicted distances were relatively similar across classes, but actual distances were lower, with Class C at 223 m, Class D at 169 m, and Class E at 196 m. No significant differences in 6MWT distances were found between classes (Class C vs. Class E: $p = 0.35$; Class D vs. Class E: $p = 0.44$). These findings align with the literature, such as Gan et al.'s(4) review of 14 studies that highlighted a significant correlation between reduced lung function and elevated systemic inflammatory markers, including CRP, fibrinogen, and cytokines. Eid et al. (5) further confirmed that lower FEV1 values were associated with increased systemic inflammation, reflected by higher IL-6 and CRP levels, which correlated with reduced muscle strength, exercise endurance, and overall health status. Additionally, De Torres et al.(6) demonstrated that systemic inflammation persists in stable COPD

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patients and correlates with functional performance, particularly noting that elevated CRP levels are associated with decreased 6-minute walking distance (6MWD) and arterial oxygen tension. Collectively, these findings underscore the interconnectedness of inflammation, lung function, and physical performance in COPD patients. The GOLD guidelines categorize COPD patients into four groups (A-D) to assess disease severity, health impact, and future risks. However, the effectiveness of this classification in predicting outcomes is still debated. The ECLIPSE(7) cohort study indicated that group D had the highest mortality while group C had a lower mortality rate than group B, a finding supported by a Danish study. (8) Although the link between GOLD groups and annual lung function decline is underexplored, some analyzes suggest that exacerbation history and FEV1 may affect long-term decline, challenging the distinction between high-risk (C and D) and low-risk (A and B) groups. Furthermore, research consistently shows that spirometry parameters decline progressively with COPD severity, with Class A exhibiting the best metrics in Forced Vital Capacity (FVC) and Forced Expiratory Volume in 1 second (FEV1), while Class D shows the lowest. Our data confirm that Class C has the highest predicted and actual FVC values, while both FEV1 and FVC values remained consistent across classes, indicating no significant differences. This highlights the clinical relevance of monitoring lung function and understanding the nuances within the GOLD classification to better predict patient outcomes and tailor interventions.

Conclusion

In conclusion, this study underscores the complex interplay between inflammation, lung function, and physical performance in COPD patients across different classes. The significant variations in Total Lung Capacity (TLC) and C-reactive protein (CRP) levels among Classes C, D, and E highlight the importance of systemic inflammation as a marker of disease severity. Despite consistent spirometry results across classes, the observed differences in functional performance, particularly in the 6-minute walk test, suggest that physical capacity may be more closely related to inflammatory status than to lung function alone. These findings align with existing literature that links reduced lung function and elevated inflammatory markers to poorer health outcomes and physical endurance. Additionally, the challenges in using the GOLD classification for predicting mortality and exacerbation risk emphasize the need for a more nuanced approach to patient assessment, integrating both spirometry data and systemic inflammation markers. Overall, our results support the ongoing need for comprehensive evaluation and tailored interventions in managing COPD, aimed at improving both lung function and overall quality of life for patients.

Statements and declarations

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• PATIENT CONSENT – Not applicable

• TRIAL REGISTRATION – Not applicable

References

1. Global Strategy for Diagnosis, Management, and Prevention of COPD. (2018). [ebook] Global Initiative for Chronic Obstructive Lung Disease - GOLD. 2016, p.4. Available at: https://goldcopd.org/wp-content/uploads/2017/11/GOLD-2018-v6.0- FINAL-revised-20-Nov_WMS.pdf [Accessed 18 Aug. 2018].

2. Soriano JB, Lamprecht B, Ramírez AS, Martinez-Camblor P, Kaiser B, Alfageme I, et al. Mortality prediction in chronic obstructive pulmonary disease comparing the GOLD 2007 and 2011 staging systems: a pooled analysis of individual patient data. The Lancet Respiratory Medicine. 2015 Jun;3(6):443–50.

3. Prabhu Rajkumar Journal of Occupational and Environmental Medicine. The Influence of Environmental Factors in Chronic Bronchitis. October 1963.5(10);468-475

4. Gan WQ, Man SF, Senthilselvan A, Sin DD. Association between chronic obstructive pulmonary disease and systemic inflammation: a systematic review and a meta-analysis. Thorax. 2004;59(7):574-80.

5. Abdullah A.Eid, Alina A. Ionescu, Lisette S, Nixon, Vanessa Lewis-Jenkins, et al. Inflammatory response and body composition in chronic obstructive pulmonary disease. Am J Respir Crit Care Med 2001; 164: 1414–18.

6. De Torres JP, Cordoba-Lanus E, Lo´pez-Aguilar. C-reactive protein levels and clinically important predictive outcomes in stable COPD patients. Eur Respir J 2006; 27: 902–7.

7. Miller J, Edwards LD, Agusti A, et al. Comorbidity, systemic inflammation and outcomes in the ECLIPSE cohort. Respir Med 2013; 107(9): 1376-84.

8. Danish, Pinto-Plata VM, Livnat G, Girish M, Cabral H, Masdin P, Linacre P, et al. Systemic Cytokines, Clinical and Physiological Changes in Patients Hospitalized for Exacerbation of COPD. Chest. 2007 Jan;131(1):37–43.